National Aeronautics and Space Administration

PROJECT KUIPER

COMMUNICATIONS SERVICES PROJECT PARTNERSHIP

NASA's Communications Services Project (CSP) is pioneering a new era of near-Earth space communications by partnering with commercial industry to enable innovative networking for future missions. CSP will leverage $278.5 million across six funded space act agreements with commercial industry to facilitate demonstrations, evaluate service performance, and identify future services and capabilities to meet mission needs.

Kuiper Government Solutions LLC has been awarded $67 million to demonstrate an optical low-Earth orbiting (LEO) relay network that can provide high and low-rate satellite communications services to LEO spacecraft. The global network will support routine missions, contingency operations, and early operations phase communications.

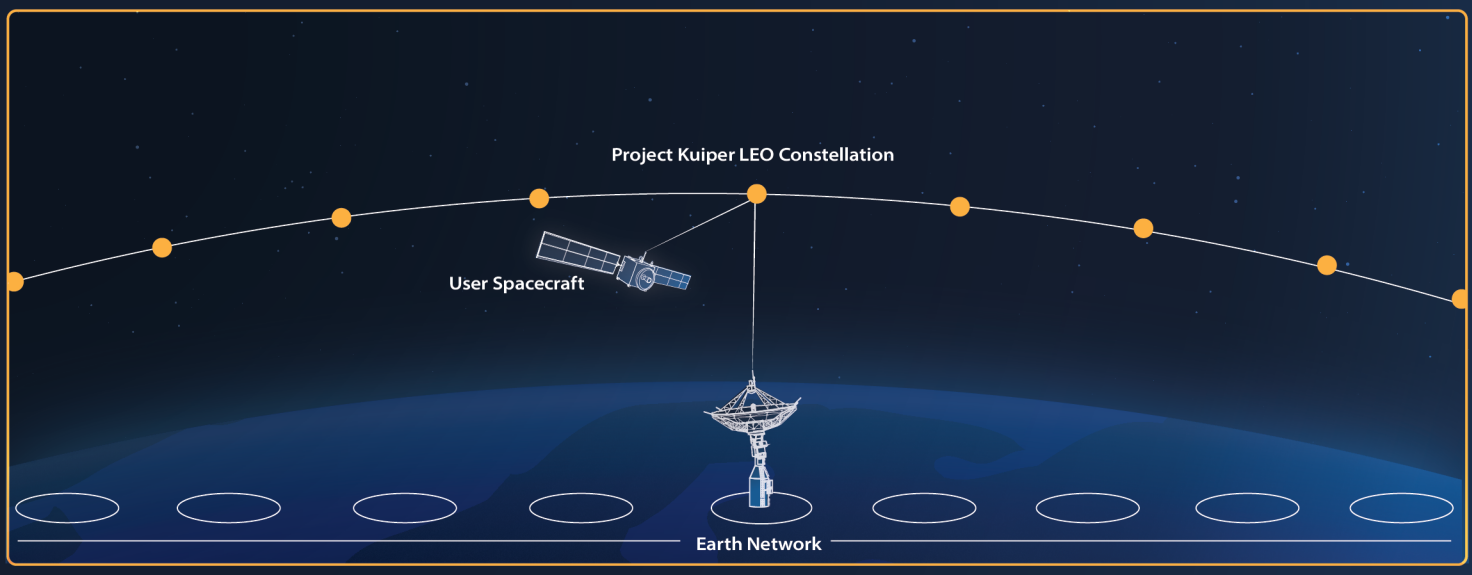
VISION

Project Kuiper is Amazon's initiative to provide fast, affordable broadband to communities around the world that are currently unserved or underserved by traditional internet and communications options. To achieve this goal, Amazon will deploy more than 3,000 satellites in LEO that link to small customer terminals on one end and a global network of hundreds of ground gateways on the other. Amazon's secure global networking will connect those gateways to the internet, public cloud, or private networks, offering resilient connectivity with end-to-end encryption to users around the world.

The satellites and customer terminals use electronically steerable phased array antennas operating in the Ka-band for space-to-ground communication. In addition, the customer terminals, satellites, and gateways all use software-defined networking and an Amazon-designed baseband chip to dynamically allocate bandwidth throughout the network, with each satellite capable of processing up to 1 terabit per second (Tbps) of data. For space-to-space communication, Amazon is testing optical links between terminals onboard the satellites to create a resilient mesh network in space.

All illustrations are an artistic interpretation of future space communications architecture.

NETWORK ARCHITECTURE



A constellation of more than 3,000 satellites deployed in LEO and equipped with optical terminals and advanced antennas will link to a secure, ground-based communications network to deliver resilient, low-latency communications to users on Earth and in space.

KEY FEATURES

- **High-speed, low-latency optical services**
- **Secure, global ground network**
- **Resilient on-orbit optical mesh networking**
- **Improved performance over traditional C- and Ku-bands**
- **End-to-end encryption for customers**

LEARN MORE

CSP is managed by NASA's Glenn Research Center in Cleveland, Ohio under the direction of the Space Communications and Navigation (SCaN) program. SCaN serves as the program office for all of NASA's space communications activities, presently enabling the success of more than 100 NASA and non-NASA missions.

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